The effect of nutrition during pregnancy on hogget reproduction

A thesis presented in partial fulfilment of the requirements for the degree of Master of Science in Animal Science at Massey University

Fraser John Mulvaney

2006

Abstract

Mulvaney, F.J. (2006). The effect of nutrition during pregnancy on hogget reproduction. M.Sc. (Animal Science) Thesis, Massey University, Palmerston North. New Zealand. 59pp

The reproduction rate of hoggets in New Zealand is much lower than that observed in adult ewes. New Zealand farmers have indicated this is a major limitation to the uptake of hogget breeding and lambing. A series of studies conducted during pregnancy in the U.K. under housed conditions, utilising a concentrate diet, reported rapidly grown hoggets had reduced placental and fetal development and lamb birth weight. It is, therefore, possible nutrition during pregnancy plays a role in the poor reproductive performance seen in New Zealand hoggets. This thesis investigates the impact of 'low', 'medium' and 'high' levels of feeding on pasture during pregnancy on hogget pregnancy rate, fetal loss, lamb birth weight and growth rate of resulting lambs.

Two-hundred-and-forty hoggets that were mated (identified by crayon tupp mark) during a five day breeding period were randomly allocated one of three (n=80) nutritional regimes ('low', 'medium' and 'high'). The 'low' treatment group during the first 100 days of pregnancy were fed to maintain live weight. From day 100 until term, these hoggets were offered herbage to ensure a daily live weight change of 100 g/day. The 'medium' treated group were fed to ensure live weight change was 100 g/day throughout the entire pregnancy period, while the 'high' treated group were offered *ad libitum*, with the aim of achieving 200 g/day throughout the entire pregnancy period.

The target live weight changes were achieved in the 'low', 'medium' and the 'high' hogget feeding treatment groups. Pregnancy rates at day 50 of pregnancy were significantly ($P<0.05$) higher in the 'medium' (66%) than the 'high' (46%) treated hoggets. At P87, pregnancy rate was significantly higher in the 'low' and the 'medium' treated hoggets than the 'high' treated hoggets with pregnancy rates of 58, 66 and 33%, respectively. This led to a significantly ($P<0.05$) reduced proportion of

the hoggets lambing in 'low' and 'high' feeding treatment hoggets when compared to the 'medium' hogget feeding treatment. Lamb birth weight was reduced in lambs born to the 'low' (3.5±0.16 kg) treatment hoggets when compared to the 'medium' (4.0±0.19 kg) and the 'high' (4.0±0.19 kg) hogget treatment groups. A 'high' level of nutrition during pregnancy did not result in reduced lamb birth weight compared to the 'medium' level of nutrition. At L87, lambs born to 'low' (18.1±1.01 kg) treated hoggets were significantly ($P<0.05$) lighter than lambs born to 'medium' (20.6±0.76 kg) and 'high' (21.8±0.98 kg) treated hoggets. The numbers of lambs reared at L87 was 15, 27 and 17 for 'low', 'medium' and 'high' treated hoggets, respectively.

In conclusion, feeding hoggets at a 'low' and 'high' level of nutrition led to a substantially reduced number of lambs produced. In addition, lambs born to the 'low' fed hoggets were much lighter than lambs born to 'high' fed hoggets at L87. Therefore, this study indicates that farmers wishing to maximise reproductive performance of hoggets should feed hoggets to ensure live weight gain during pregnancy is above 60 g/day but below 200 g/day.

Acknowledgements

The past 2 years have been a huge learning experience and many have been involved. I am extremely grateful to my supervisors, Associate Professor Steve Morris, Dr Paul Kenyon and Professor Dave West. Without their "open door" policy my questions would have never been answered. Thank you. Also, thank you to Allain Scott for looking after the post graduate students and answering my often stupid questions. A special appreciation of the lecturers involved in taught papers during the past two years. These include Professor Hugh Blair, Dr Sam Peterson, Dr Ian Brookes, Dr Cory Matthew and Dr Simone Hoskin.

The help and time spent with the 'girls' has been invaluable. The amount of questions that have been thrown in your direction have been accepted and generally answered by more than one of you. Also, the time spent outside of IVABS was very entertaining and enjoyable. So.....thank you to Amanda, Beck, Rene, Gina, Jo, Kathryn and Dannie (plus Jeremy... although you are not a girl). During the trial there was an influx of Dutchies and their help must be mentioned. Thank you to... Nell, Judith, Marieke and Loes. To the staff at Murphy's, thanks for providing a place to relax, chat and socialise.

Also thank you to Dean Burnham, Graeme Poole, Ross Bagley, Geoff Purchas and Peter Fitzherbert for the time put into organising the on-farm work and especially to Dean for the knowledgeable input throughout the trial.

To Mum, Dad, Hamish and Anna, thank you for your encouragement and help throughout the past two years. Especially to Dad, thank you for allowing me to follow you round as a youngster and inspiring my interest in agriculture, then helping me during university and then your input into this thesis has been invaluable. Also, thank you for the long phone calls and the e-mails answering my questions and offering your suggestions.

A special thank you to Meat and Wool New Zealand for financial assistance and C. Alma Baker, Helen E. Akers and John Alexander Hurley trusts for personal financial assistance.

Table of Contents

List of tables